SCIENCE NEWS

THE DISTANCE OF BETELGEUSE

Science Service

THE astronomers have finally taken the measure and determined the distance of Betelgeuse, the giant red star in the constellation of Orion. At the recent meeting of the National Academy of Sciences, Dr. S. A. Mitchell, director of the Leander McCormick Observatory at the University of Virginia, announced that the distance of this mighty sun from the earth had been calculated to be 175 light years. With the measurements of the apparent diameter of Betelgeuse made about two years ago by Professor A. A. Michelson, of the University of Chicago, this makes possible the determination of the actual diameter of the star, which is found to be 242,000,000 miles.

A light year is the distance which light, traveling at a velocity of 186,000 miles in a second, traverses in a year. Light takes about eight minutes to come from the sun. The distance of Betelgeuse is so vast a number of miles that it is best understood by reducing the scale of measurement. If the distance of the sun from the earth be taken as one inch, making the diameter of our solar system across the orbit of Neptune, the outermost planet, some five feet and a half, then the great star in Orion would be 175 miles away.

On the same scale the sun would be a mere grain of dust one hundredth of an inch in diameter, while Betelgeuse would be somewhere between the sizes of a golf ball and a tennis ball.

The announcement of the distance of Betelgeuse as measured at the University of Virginia was part of an announcement by Dr. Mitchell of determinations of the distances of some 600 stars. The distance of the giant in Orion corresponds exactly with the average of observations previously made at the Mt. Wilson Observatory in California and at other noted observatories.

Measurement of the distances of the stars is made on exactly the same principle as is used by a surveyor to measure the distance across a river he can not cross, or by a range-finder to determine the distance of an enemy vessel at sea. Everybody knows that the same thing looked at from varying positions of view has a varying background. If a line be measured and the distant object viewed from the two ends of it and the angles which it makes with that "base line" accurately measured, the distance may easily be calculated by trigonometry.

That is the way the astronomers measure the distances of the stars. The only difficulty is getting a long enough base line. The biggest base line obtainable is the diameter of the earth's orbit, some 186,000,000 miles, but as against the vast distances of stellar space this is almost too minute to use as a measuring rod. The variation in the position of Betelgeuse at the extremes of this distance amounts to about as much as that of 21 inches seen at a distance of 4,000 miles. In the case of a star this angle is called the "parallax." These determinations are taken six months apart for each star since the earth is then at opposite sides of its orbit.

The work of the Leander McCormick Observatory under Dr. Mitchell's direction in measuring the distances of 600 stars is considered of great importance, as up till about 10 years ago the distances of not more than 100 were known with approximate accuracy. Distance measurements are essential to all determinations of a star's real diameter and motion through space and are of great value in determining the velocity and direction of the motion of our own sun, carrying with it the earth and its brother planets through the pathless abysses of space.

THE PILTDOWN MAN

Science Service

MAN may have evolved completely from apes in western Europe, according to conclusions as to the relationship of the teeth from the famous Piltdown jaw with those of ancient apes and early and modern men announced by Dr. Aleš Hrdlička, curator of anthropology of the United States National Museum. Thus a European instead of an Asiatic origin of the human race is indicated.

The fossilized jaw has been a subject of dispute among scientists since its discovery near Piltdown, England, in 1912. Some scientists have maintained that it belonged to a very early human being. So primitive and simian-like is it, however, that others have declared it to be that of a chimpanzee. Recently Dr. Hrdlička made a trip to Europe especially to examine the original fossil. He made careful measurements of the length and breadth of the crowns of the teeth of this ancient relic.

From a comparison of these measurements with the corresponding molars of a large number of European, American, Egyptian, Chinese, Lapp, Eskimo, Indian, Polynesian, Melanesian, Australian, negro and other modern peoples, he declared to-day that the only conclusion that appears justified is that the Piltdown teeth, primi-

tive as they are in some respects, are already human or close to human.

Comparison with the measurements of the teeth of a large number of cave men teeth shows closer connection with the earlier than with the modern types of human beings.

Generally speaking, the more recent the teeth, more particularly the first molars, the shorter they are, the length of the crown of the tooth from front to back appears to diminish with the progress of time, while the breadth remains about equal. The Piltdown teeth in breadth are ordinary human, but they are longer than those of either present day or early man.

After determining the human relationship of this "Dawn Man," as has been called, Dr. Hrdlička secured from the National Museum collection a large number of teeth of ten American and twelve European species of apes, including chimpanzees, orang outangs, gibbons and others.

He found that the Piltdown man did not connect with any of the living forms of anthropoid apes. In Bohnerz Alb, one of an extinct line of large western European apes known as *Dryopithecus rhenanus*, however, he found a striking similarity both in shape and size, although difference in detail, with the teeth of this early Piltdown man.

"The close relation of the Piltdown molars to some of the Miocene or early Pliocene human-like teeth of this fossil ape, while not conclusive alone," according to Dr. Hrdlička, "raises legitimately the query as to whether man may not have evolved altogether in western Europe."

The differences in the sizes of male and female were taken into consideration in the investigation. It was often necessary to use a magnifying glass and take a number of measurements of each tooth to insure the greatest accuracy in the results.

Dr. Hrdlička holds that the Piltdown jaw is much older than the skull found near it and to which it had been supposed to belong. He placed the Piltdown jaw as much older than the Heidelberg jaw or that of any other European cave man.

A POSSIBLE NEW KIND OF WATER

Science Service

A NEW kind of water, unknown in nature, may be created in the laboratory, Sir J. J. Thomson, discoverer of the electron and master of Trinity College, Cambridge, England, predicted in his recent lectures at the Franklin Institute before a selected group of about 300 leading American physicists and other scientists.

Water is made up of two atoms of hydrogen and one atom of oxygen, as every high school student knows. Professor Thomson and many others since his pioneer work on the composition of matter have been determining how those atoms are arranged. In recent years a theory of the structure of water has been worked out that allows the arrangement of the hydrogen atoms symmetrically in several ways. This is not entirely satisfactory because such an arrangement should make water non-polar in its action toward light, while in reality water lets light through it more easily in one way than another. Now Professor Thomson suggested that the atoms of ordinary water are in the form of a twisted cube giving only one possible symmetrical grouping of the hydrogen atoms. This arrangement theoretically would have properties that would fit the sort that we use and drink every day. The new or allotropic form of water would have the form of an ordinary cube. The new form and ordinary water would be related somewhat like diamond and ordinary black carbon, which are both carbon.

Professor Thomson believes that the new kind of water is perhaps experimentally realizable by the aid of a strong catalyst, or a substance that helps a chemical operation, but does not actually enter into it. If it is found he predicts that it will have a large amount of energy and low stability, and unlike ordinary water, it will conduct electricity fairly well.

THE HONDURAS SPOTTED TURKEY

Science Service

AN expedition of the United States Biological Survey is to penetrate Central America with the capture of live specimens of the beautiful Honduras spotted turkey as its objective. The result will be the first attempt ever made to domesticate this rare wild bird. Harry Malleis, of the Department of Agriculture, has left for Belize, British Honduras, equipped for the difficult task of bringing a number of these turkeys to the United States.

It is planned to place these birds on Sapelo Island, off the coast of Georgia, under conditions which it is believed will be favorable for their propagation. If they prove adaptable to this country, further steps will be taken to domesticate and introduce them.

It is stated that prediction as to the outcome of the experiments could not be made at this time. They pointed to a large number of birds and animals which had upset calculation in the past. The nightingale introduced into this country soon died out, while the English sparrow multiplied rapidly.

The Honduras or ocellated turkey, the range of which extends over only a limited section of

Yucatan, Honduras and Guatemala has been greatly admired for the brilliantly colored eye-like spots on its feathers and for its excellent meat. It is somewhat smaller than our domesticated turkey, but the taste is said to be similar. Although it is found in the region occupied by the Mayan, who had the oldest and most brilliant civilization on this continent, as far as is known it has never been domesticated.

The expedition will also secure a large number of curassow, a larger turkey-like bird with crested head. If practical, Mr. Malleis will visit Turneffe Island, off the coast of British Honduras, and collect specimens of the wild life there. Little is now known of the natural history of this island.

FIELD EXPEDITIONS OF THE AMERICAN MUSEUM OF NATURAL HISTORY

Press Bulletin, American Museum of Natural History, New York City

TUESDAY, April 17, was a red letter day at the American Museum of Natural History, for it brought to the authorities of that institution most welcome news from two of its expeditions in far off lands. The first to make its appearance was a cable from the Faunthorpe Indian Expedition stating that with the cooperation of the Maharajah of Mysore, the leaders of this collecting party, Colonel Faunthorpe and Arthur Vernay, had been eminently successful in getting representative specimens of wild Indian elephants and had completed the Bison group for the Museum.

Later in the day, a cable arrived from Roy C. Andrews, the leader of the Third Asiatic Expedition, stating—"Granger returns safely with choice collection. Mongolian expedition leaves to-morrow." This news was gratifying in more ways than one. First, that Walter Granger, the intrepid collector of fossils, had come through the dangerous zones safely. Second, that he had, in spite of great difficulties, succeeded in bringing his collections with him, which, report had it, he would have to sacrifice after months of arduous work in order to get through alive; and, thirdly, that Andrews was on his third year's search in new fields for more finds.

The public generally assumes that museum collectors ride about in ease and comfort, picking up at random what may be interesting. It is probable that some collectors do, but as yet this happy way of finding rare specimens has not fallen to the lot of any of the Third Asiatic party. Mr. Andrews, in a letter written on St. Patrick's Day, writes of the poisoning of the Russian Minister of War at Urga, that fearing a rebellion among the natives, all of the Mongols have been disarmed; that while a number of people have been shot thus far, the disturbance has been mainly confined to the Urga region. He was also worried about Granger, as a big row had started in his vicinity, and as yet word had not been received from him. However, knowing how tactful and resourceful Granger is, he felt that he would come through all right, but would very likely have to abandon the results of his season's work.

This year the expedition hopes to have a good wireless receiving set, and in this way hear from the outside world the happenings of the day. To the many friends of Andrews, Granger and Pope, word that success has thus far attended all their work comes as welcome news, and the authorities of the museum, of *Asia Magazine* and the Asiatic Society, through whose cooperation the expedition was made possible, are practically assured of further new and interesting contributions to science and literature.

A POLLUTED WATER SUPPLY

ACCORDING to a statement issued by the New York State Department of Health, over one thousand people in an up-state community noted as a health resort have recently been made ill as the result of the action of the water board in temporarily changing the source of the public water supply without taking precautions to insure its safety or notifying the health officer. So far no cases of typhoid fever have been reported, but it will be remarkable if the community escapes an outbreak of this disease.

On account of a shortage in the regular source of water supply, the superintendent of the water works was instructed by the water commissioners to draw an emergency supply from a lake which is seriously polluted by sewage from a number of houses and by surface wash from a large area of the village. Only eight or nine days later did the local health officer learn what had been done and then only upon telephoning to the water board after his suspicions had been aroused by the large number of complaints of illness which were reaching him. Upon ascertaining the facts the health officer immediately telephoned to the State Department of Health and an engineer from the division of sanitation was at once dispatched to install an emergency chlorination apparatus which rendered safe the temporary use of the lake water.

In the course of installing the chlorination apparatus, the engineer had to descend into a well from which the water was being pumped. Because of a break in a connecting tube of the apparatus and the lack of ventilation, his face

was burned with chlorine gas, but he succeeded in completing the installation. The State Department of Health has frequent occasion to loan its emergency chlorination apparatus for temporary local use in the protection of public water supplies, but this is the first accident of the kind which has occurred. While there is not the slightest danger of any possible adverse effect upon the sanitary quality of the water from such an accident, the occurrence disclosed the need of special protection to the engineers handling such apparatus under certain unusual conditions, and the department has decided to purchase a gas mask to meet this need.

Dr. Hermann M. Biggs, state commissioner of health, in making public the facts regarding this outbreak, emphasized the danger to the public health involved in any lack of cooperation between local water boards and local health officers. "Other communities," said Dr. Biggs, "should assure themselves at once that the officials in charge of their public water supplies make it a practice immediately to notify the local health officer of any change in the source of supply. If the water board in this case had promptly informed the health officer of its plans, the State Department of Health would have supplied the chlorination facilities immediately and much illness and serious danger to the community would have been avoided. The practice of treating public water supplies with chlorine is now practically universal, and in many instances it is vitally important to make use of this simple, inexpensive and harmless expedient for the protection of the public health. The water supplies of New York City and many other communities in this state are already safeguarded in this manner.

In order to minimize the danger of such occurrences in the future, the state commissioner of health has caused to be introduced in the legislature a bill making local health officers ex-officio members of local water boards, so that they may be fully informed of all conditions affecting the public water supply. Pending the enactment of such legislation, Commissioner Biggs requested the public health council, at its meeting on April 10, to amend the state sanitary code so as to require local water boards to report to the health authorities any proposed change in the source of supply.

ITEMS

Science Service

A LIGHTHOUSE of unrivaled altitude and power, embodying all the most modern devices to insure the farthest transmission of its rays, has been proposed as a memorial to Christopher Columbus by delegates from Santo Domingo to the Pan American Conference, according to advices which have been received by the Pan American Union. It would be built on Santo Domingo and paid for and supported by the twenty republics of the western hemisphere. The location is advocated by the Santo Domingans because that island was the site of the first Spanish city in the new world, founded by Columbus himself, who lies buried there. The light would be placed upon a sufficiently high elevation so that its rays might be seen by vessels traversing the principal routes from Europe to the Panama Canal. Plans already submitted call for a unique design, that of a lighthouse surmounting a globe 150 feet in diameter, the lantern itself to be 385 feet above the ground. As a final touch it is proposed that the light be of the flash type and that its particular flash be the word "Colon" spelled out in the Morse code, reminding all travelers by the great sea route of the western hemisphere of the name and fame of the discoverer of the continent.

AN astonishingly rapid migration of an empty, sealed bottle, cast overboard at sea, is reported by the United States Hydrographic Office. Enclosing nothing but a "bottle paper," on which directions for its return were printed in seven languages, the bottle was put overboard from the S. S. *West Isleta* in the Pacific Ocean about 100 miles off the Central American coast on the last day of the year 1920. The little wayfarer of the seas was picked up on Misool Island, northwest of New Guinea, just about 8,400 miles across the whole width of the Pacific, on January 23 of this year. That would give an average drift of about 11 miles a day, assuming the bottle to have taken the shortest line, to have made no stopovers along the strands of the alluring South Sea islands, and to have been picked up immediately on its arrival at Misool. This, the Hydrographic Office, knowing the habits of bottles and of the South Seas, considers improbable.

THE action of the transatlantic steamship companies in adopting the suggestions of the United State Hydrographic Office relative to the shifting of the usual summer steamer tracks to the south is shown to have been timely by the weekly ice charts of the Hydrographic Office. Many bergs are reported on the old westbound track from the north of Ireland and Scotland to New York and Boston. Only one is reported dangerously near present tracks.

RECENT investigation of textile workers in England has shown that artificial lighting reduces the efficiency of workers by eleven per cent. of its normal daylight value.